

We claim:

1. Apparatus for comminuting solid waste material comprising:

drive means for providing rotary motion, a pair of cutter stacks with cutter elements of one stack interleaved with cutter elements of the other, and gear means to transmit the rotary motion of said drive means into counter-rotation of cutter elements of one stack with cutter elements of the other, each of said cutter stacks comprising a central shaft journaled for rotation proximate each end, a seal-bearing assembly at each end comprising an end housing, a pair of insertable pre-assembled bearing elements mountable in each of said end housings, one bearing element having a thru-hole for journaling a first shaft for rotation and a second bearing element having a thru-hole for journaling a second shaft for rotation and a seal for each of said first and second bearing elements to provide fluid isolation between <sup>said bearing element and</sup> said end housing.

2. The apparatus of claim 1, wherein each of said pre-assembled bearing elements comprises a seal cartridge, a spring mounted on the seal cartridge, a dynamic race biased by said spring, a bearing cartridge, a static race mounted on said bearing cartridge, a bearing mounted in said bearing cartridge and means to secure said bearing in said bearing element and to urge said static race into contact with said dynamic race.

3. The apparatus of claim 2 further comprising seal means to fluid isolate said bearing from said static race.

4. The apparatus of claim 2 further comprising spring means to bias said bearing cartridge in said end housing.

5. The apparatus of claim 1 further comprising a labyrinth positioned on top of both bearing elements, said labyrinth insertable onto said end housing and

1 having a flange conforming in shape to a portion of each  
2 end <sup>housing</sup> ~~assembly~~ proximate to said cutter stacks.

1 6. The apparatus of claim 1 further comprising an  
2 inspection port in said gear means.

1 7. The apparatus of claim 2, further a spring to bias  
2 said static race and provide axial float for said static  
3 and dynamic races.

1 8. The apparatus of claim 1 further comprising a  
2 labyrinth mountable on <sup>said</sup> ~~an~~ end housing and protruding in  
3 part into the influent stream, said labyrinth having a  
4 bearing surface that causes said labyrinth to elastically  
5 deform and compensate for variations in cutter stack  
6 height.

1 9. The apparatus of claim 1 further comprising a  
2 housing for said gear means, and means to mount one of  
3 said end housings to said housing for said gear means.

1 10. The apparatus of claim 1 further comprising a seal  
2 disposed on each central shaft to isolate ends of said  
3 shafts from said <sup>seal-bearing assembly</sup> ~~seals~~, each of said seals positioned in  
4 said housing.

1 11. A solid waste material comminuting system  
2 comprising:

3  
PI an electric motor for providing rotary motion, a  
pair of cutter stacks with cutter elements of one stack  
interleaved with cutter elements of the other, and gear  
means to transmit the rotary motion of said electric  
motor to counter-rotate cutter elements of one stack with  
cutter elements of the other, each of said cutter stacks  
comprising a central shaft journaled for rotation, a  
seal-bearing module at each end of the central shafts,  
each seal-bearing module comprising an end housing, and  
a pair of insertable pre-assembled bearing assemblies  
mountable in each of said end housings, one bearing  
assembly having a thru-hole for journaling a first shaft  
for rotation and a second bearing assembly having a thru-

hole for journaling a second shaft for rotation and a seal for each of said bearing assemblies to isolate it from said end housing.

1 12. The apparatus of claim 11, wherein each of said pre-  
2 assembled bearing assemblies comprises a seal cartridge,  
3 a spring mounted on the seal cartridge, a dynamic race  
4 biased by said spring, a bearing cartridge, a static race  
5 mounted on said bearing cartridge, a bearing mounted in  
6 said bearing cartridge and means to secure said bearing  
7 in said bearing assembly.

1 13. The apparatus of claim 12 further comprising seal  
2 means to fluid isolate said bearing from said static  
3 race.

1 14. The apparatus of claim 12 further comprising spring  
2 means to bias said bearing cartridge in said end housing.

1 15. The apparatus of claim 11 further comprising a  
2 labyrinth positioned on top of both bearing assemblies to  
3 provide a wear interface between said bearing assemblies  
4 and the influent flow, said labyrinth conforming to a  
5 portion of each end <sup>housing</sup> ~~assembly~~ to provide a removable  
6 mounting surface.

1 16. The apparatus of claim 11 further comprising an  
2 inspection port in said gear means.

1 17. The apparatus of claim 12, further a spring to  
2 bias said static race and provide axial float for said  
3 static and dynamic races.

1 18. The apparatus of claim 11 further comprising seal  
2 means carried by each of said shafts and positioned in  
3 each of said thru-holes to provide fluid isolation for  
4 the ends of each of said shafts.

1 19. The apparatus of claim 11 further comprising a  
2 housing for said gear means, and means to mount one of  
3 said end housings to said housing for said gear means.

20. The apparatus of claim 11 further comprising a seal  
disposed on each central shaft to isolate ends of said

shafts from said <sup>seal-bearing module</sup> seals, each of said seals positioned in  
said housing.